PP series user manual

This manual is only for operating instructions and does not serve as repairing service.

Changes

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1. SAFETY

This chapter contains important information to prevent personal injury and product damage when you install the display. Read this chapter and keep it properly. Ensure that you understand and follow all the safety instructions and warnings in this chapter before installing.

Personal Protection

	Warning: Ensure that you understand and follow all the safety instructions, warnings mentioned in this manual.
	Warning: Pay attention to electric shock.
	Warning: Wear a hard hat to reduce the risk of personal injury.
	Warning: Be aware of suspended loads.
	Warning: Mind your fingers while dealing with heavy loads.

Personnel of installation and maintenance

The installation and maintenance of this product must be performed by authorized and qualified technical personnel only. The manufacture does not take responsibility for the results caused by incorrect, improper, irresponsible and unsafe actions.

GND and Lightning protection

Do not underestimate the safety protection of grounding plug/socket. If the supplied plug/socket is defective, replace the defective parts. Ground the product correctly to avoid electric shock caused by large electricity leakage.

Disconnect the power in the time of lightning, or provide other suitable lightning protection device. Disconnect the power plug when the product is not used in a long period.

Ambience of installation and use

- The ambient temperature for LED display: max 40°C, min 0°C.
- Ensure that the ventilation is good. Do not jam or drop metal particles and cable pieces into ventilation opening. Keep the ventilation surface clear without foreign matters like wrapping materials. False actions may lead to poor ventilation and cause fire, malfunction and error.
- Install LED display far away from radiator, heater, furnace and other equipments hindering ventilation and heat dissipation (including but not limited to amplifier, laser, ultrasonic vibration devices), flammable materials (like curtains) and other unsafe devices.
- I/O signal cables should be shielded to restrain the high-frequency interference.
- LED display can not contact with any corrosive and abrasive matter. Do not use LED display in moist ambience, in ambience containing airborne contaminant, dust, oily fume, corrosive gas and flammable gas, and in ambience with vibration and shock.
- This LED indoor product is designed only for indoor use. Never install and use it in outdoor environment and keep it far away from direct sunlight, dust and moisture.

ESD and LED:

LED components are ESD (Electro-static Discharge) sensitive. Do not touch LED components when the display is in operation or switched off.

Disconnect device:

When the appliance inlets of the individual tiles are not accessible, the socket outlets supplying the rack shall be installed near the equipment and be easily accessible, or a readily accessible general disconnect device shall be incorporated in the fixed wiring.

Mounting parts:

The mounting parts are only used to install LED display. Do not repair or copy. Only use parts appointed by the manufacturer. Contact LIANTRONICS if you want customized application.

Product care:

Inspect all installations on a routine basis to check security, wear, deformation, corrosion or any other situation that reduces load-carrying capability. Increase inspection frequency for key parts. Keep structural and mounting parts dry, clean, lubricated (only if recommended), coated properly, and maintain complying with part design. Defective parts must be removed or replaced at once.

Installation and wiring:

Install the display and connect cables following the manual instructions. The installation and wiring must be secure. Poor connection may lead to malfunction. Do not step on power/data cable or squeeze plug, socket and power/data cable. Do not suspend any items on cables or the back of LED display. Connect or disconnect the cables of data communication, extension module or control unit after the power is off to prevent product damage or malfunction.

Risk of electric shock:

- To avoid electric shock and damage , do not dismantle the inside electrical parts.
- Hot plugging the cable is forbidden to prevent electric shock or circuit damage.
- Keep clean after installing and cabling. Be ensure all the devices and terminals are covered before turning on the power.
- Do not touch the terminals when power is on. Clean and screw the terminals when power is off.

Moving or transporting product:

Do not hit the corners of LED tiles when installing or dismantling LED tiles. Be careful when moving or transporting the product to prevent any damage.

LED tiles can not be transported in containers other than LIANTRONICS flight cases or packaging. Even the use of LIANTRONICS packaging does not guarantee the LED tiles against damage due to excessive force of impacts. All warranty claimed regarding damaged modules due to incorrect packing will be rendered invalid.

2. Installation requirements

This chapter specifies the requirements for safety, mechanism, electricity and control software of PP series.

Warning: This LED indoor product is designed only for indoor use. Never install and use it in outdoor environment and keep it far away from direct sunlight, dust and moisture.

2.1 Mechanical Requirements

Weight

Warning: Do not underestimate the weight of the PP series. Be sure that the floor or truss installation on which the PP series has to be installed is capable of handling five (5) times the complete load of the display. For floor mounting, conclude the weight of any other load.

Horizontal surface

For floor installation, the floor on which PP series is installed must be horizontal. Never install LED display on a slant surface.

Ballast

Depending on the height of the display and the position of the LED display upon the foot beams (somewhere between front and middle) , additional weight (ballast) will be required. Consult professionals of LIANTRONICS to calculate the minimum ballast you require for safe installation of the LED display.

Installation ambience

- **Environmental conditions:** humidity, ventilation, temperature, etc.
- **Location:** Altitude, etc.
- **Front clearances:** for optimal effect, ensure that enough free space is supplied in front of the LED display and respect the minimum viewing distance.
- **Comply with local regulations regarding such installations.**

2.2 Electrical Requirements

Power requirements

Electrical parameter	
Input voltage	220±15% (According to the actual situation)
Average power consumption	815W
Max power consumption	2450W
Input power frequency	50/60Hz
Max supply current	11.1A
AC/DC Power supply electrical specification	Input voltage: 220±15% Output voltage: 57.6VDC Output current: 0～50A
AC/DC Power supply electrical specification	Input voltage: 36VDC～76VDC Output voltage: 5VDC Output current: 0～30A
Power cable standard	3 X 2.5mm^2

Power system

It is recommended to use power distribution system with a separate neutral and grounding conductor to avoid large current loops due to voltage differences in the neutral conductor.

- Protect the electrical installation by switch, circuit breaker, over-voltage protector, defective-grounding circuit breaker with proper rated power.
- Install the display in accordance with local electrical installation standards. In Europe, comply with EN 60364, the standard for electrical installation of buildings. In Germany, comply with EN 60364. In America, comply with National Electrical Code ANSI/NFPA 70.

Protective grounding

To prevent against the risk of electric shock, the installation should be properly grounded. Defeating the purpose of grounding will expose you to the risk of electric shock.

3. System Introduction

3.1 Brief Introduction

PP series of Liantronics, the super-size LED digital signage, defines an electronic totem in digital times. As the combination of hi-tech and artistic creation, it combines information transmission, artistic expression and time connotation as one.

3.1.1 Key Benefits

- Super durable design
- High grade protection with tempered glass
- Hot backup system
- Double backup power supply
- Remote control and monitoring system
- Centralized cluster network and remote control system to monitor and manage the status of LED screen
- Embedded with video monitor and ammeter
- Access for WiFi/3G wireless and wired network
- 4.1 sound track output

3.1.2 Applications

PP seriess are perfect for airport, subway station, train station, large shopping mall, star grade hotel, book store, pavilion, conference center, cinema, bank, office, etc.

3.2 System Components

PP series series includes the following basic components:

- **LED Display:** PP series
- **Control System:** control computer, LED display controller, distributor, control system software

3.3 System topological graph

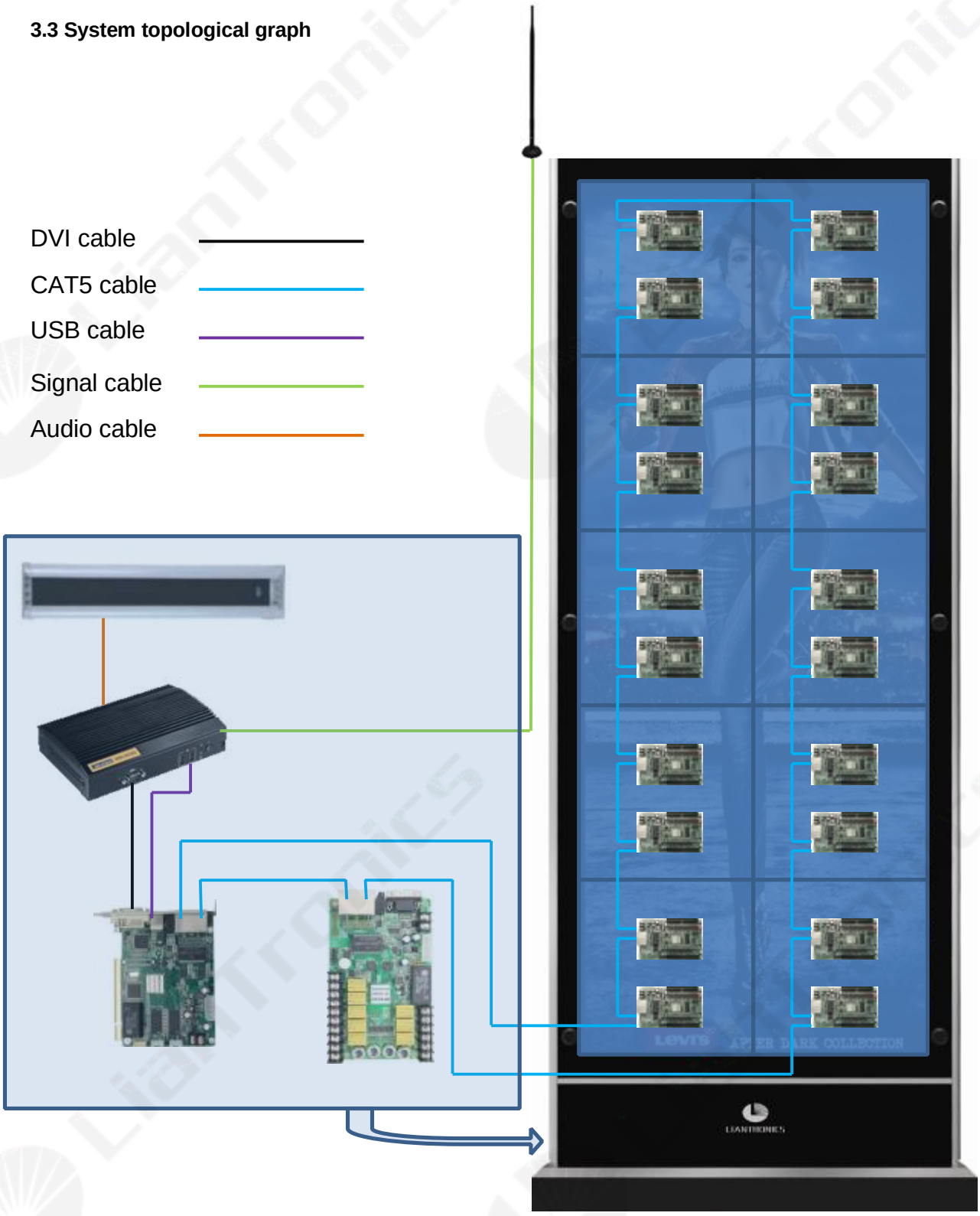


Image 3-1 System topological graph of PP series

3.4 LED Display Components

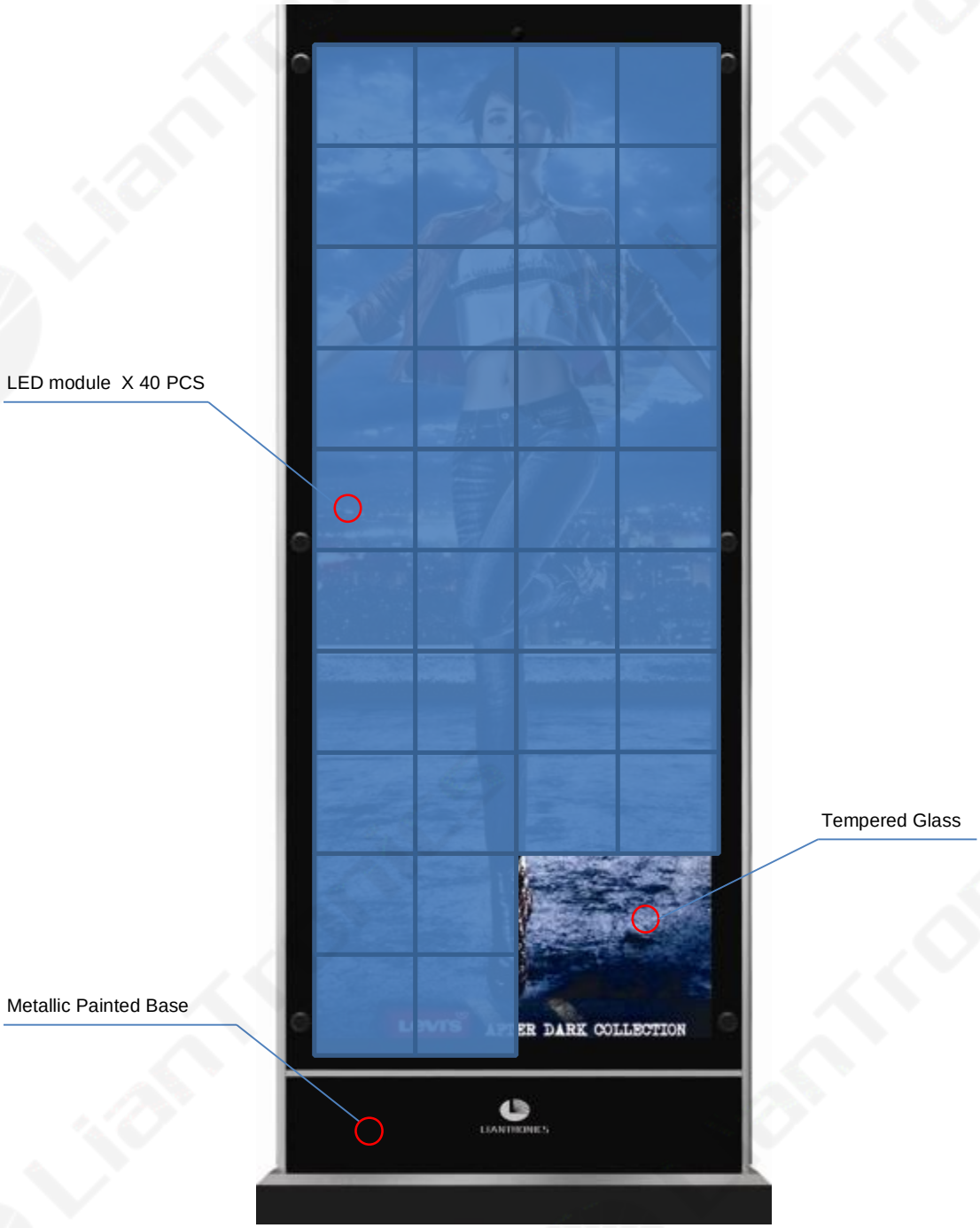


Image 3-2 The front face of PP series

Image 3-3 The back face of PP series

3.5 PP series Module

PP series module includes die-casting aluminum base frame, PCBA, etc. At the back of the die-casting aluminum base frame, two copper screw holes are inlaid at each side to fix the module to the frame. The black LED lamp array lies in front of PCBA. LIANTRONICS adopts the black full color SMD LED lamps. The use of black organic silicone and diffuser makes the black LED lamps darker to improve the contrast of the display significantly.

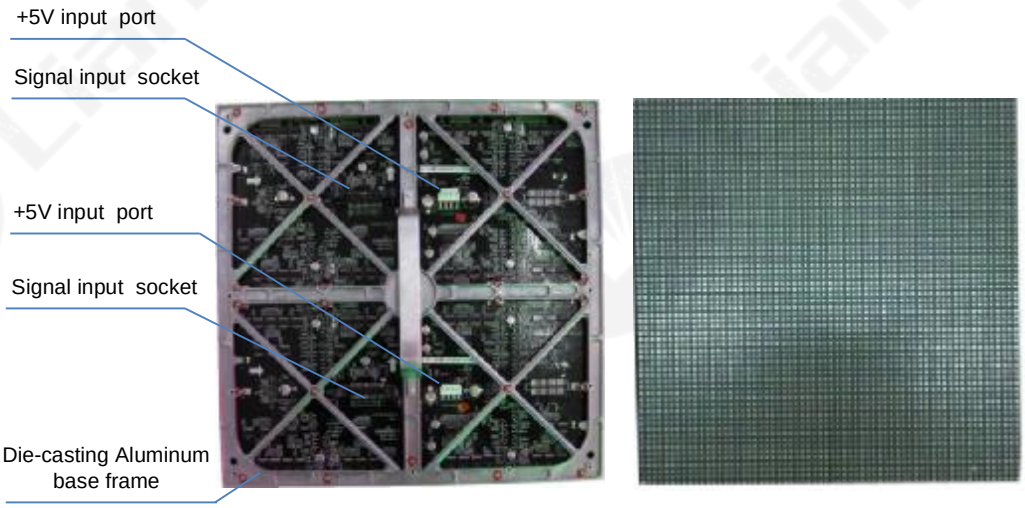

+5V input port
Signal input socket
+5V input port
Signal input socket
Die-casting Aluminum base frame
Back side of the LED module
Front side of the LED module

Image 3-4 The components of P3 module

3.6 Control system

3.6.1 LED Receiver Card

The functions of the MRV300 receiver card are shown as below:

- •Power supply: 3.3 - 5.0V
- •Temperature monitoring (standard feature)
- •Power supply voltage monitoring (standard feature)
- •Working status monitoring (standard feature)
- •16 RGB data groups output (it can be extended to 32 groups.)
- •Load capacity of single receiver card up to 256×128
- •Support pixel level brightness/color calibration

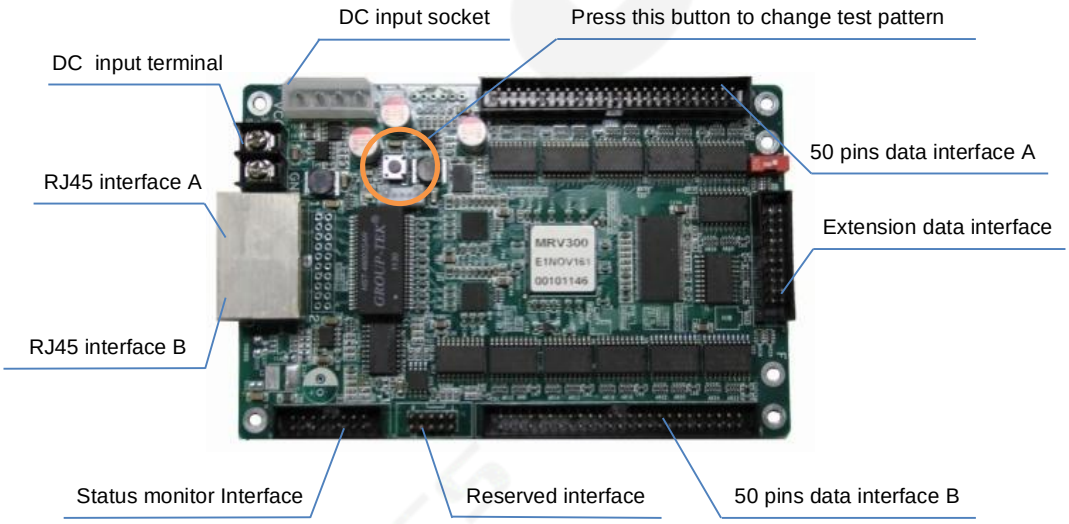


Image 3-5 MRV300 receiver card

Off-line Test

The receiver card supports off-line test. Users can test each parts of the PP series without connecting with LED control system. The test steps are as below:

1. Make sure that the receiver cards are connected with each of the LED modules but not connected with CAT5 data cable.
2. Turn on the LED screen, the tiles show nothing.
3. Press the black switch on the receiver card seven times. Then the display contents on the LED tile will be changed to Diagonal, Grey, Red, Green, Blue, White and Black in order.

3.6.2 MSD300 Transmitter Card

1.DVI interface for video input

2.USB interface for instruction communication

3.Audio input interface

4.Resolutions supported:1024*1200, 1280*1024, 1600*848, 1920*712, 2048*640

Caution: A multifunction card is required for outputting the audio.

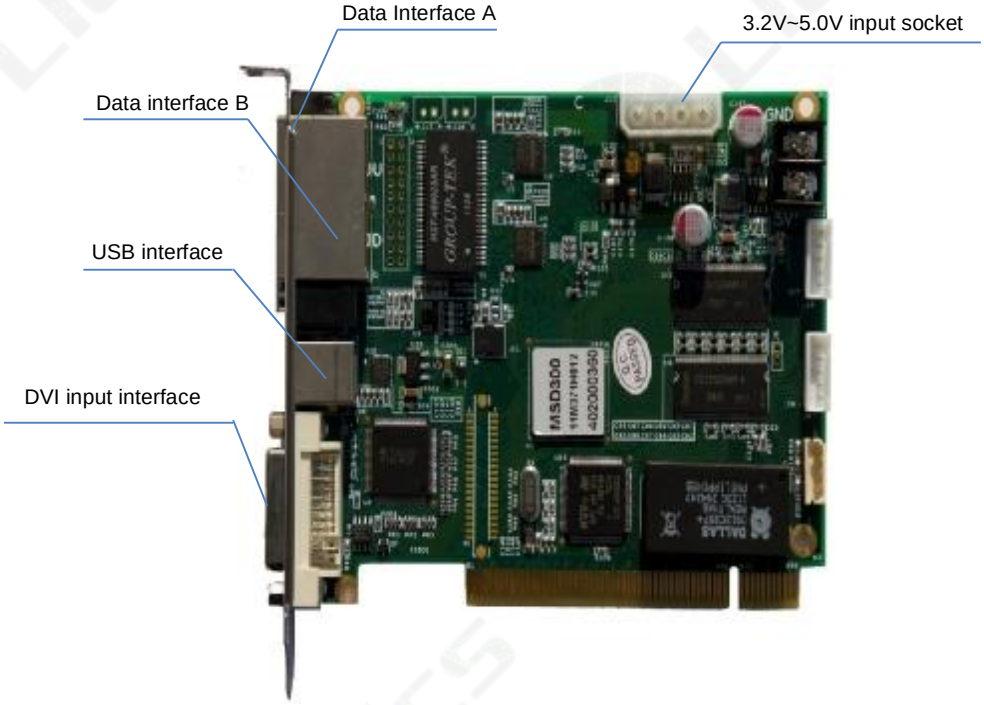


Image 3-6 MSD300 transmitter card

3.6.3 MFN300 Multifunctional Card

1.RJ45 ports for connection with receiver cards

2.serial ports for connection with the control computer

3.Support 8 power supply control

4.Support light sensors

5.Support temperature and humidity monitoring

6.Audio input interface

Caution: For audio output, the multifunctional card needs to be connected between receiver cards or at the end of the cascading chain.

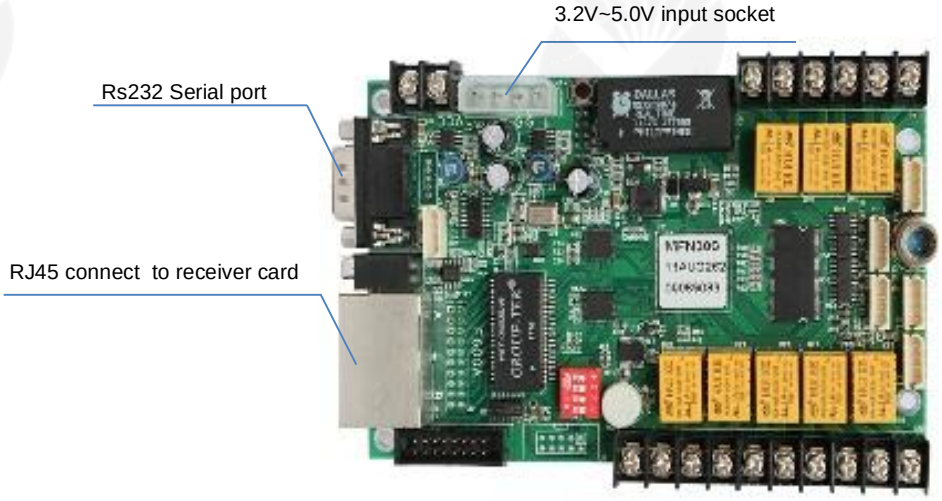


Image 3-7 MFN300 multifunctional card

3.7 LED System Control Software

NovaLCT-Mars control software is used to configure and control LED display through PC in Graphics User Interface.

Image 3-8 NovaLCT-Mars control software interface

Note: For more information about installation and instruction of control software, consult *Nova LED Display Control System –Mars 3 User Manual.*

3.8 Power Distribution System

The power distribution system of the PP series has air switch, leakage protection switch, fuses, AC contactors. The system has protection of overvoltage, overcurrent, undervoltage, short circuit, open circuit and leakage. The main switches in the power distribution cabinet are made of the Schneider devices and all other accessories and wires has "CCC" certification.

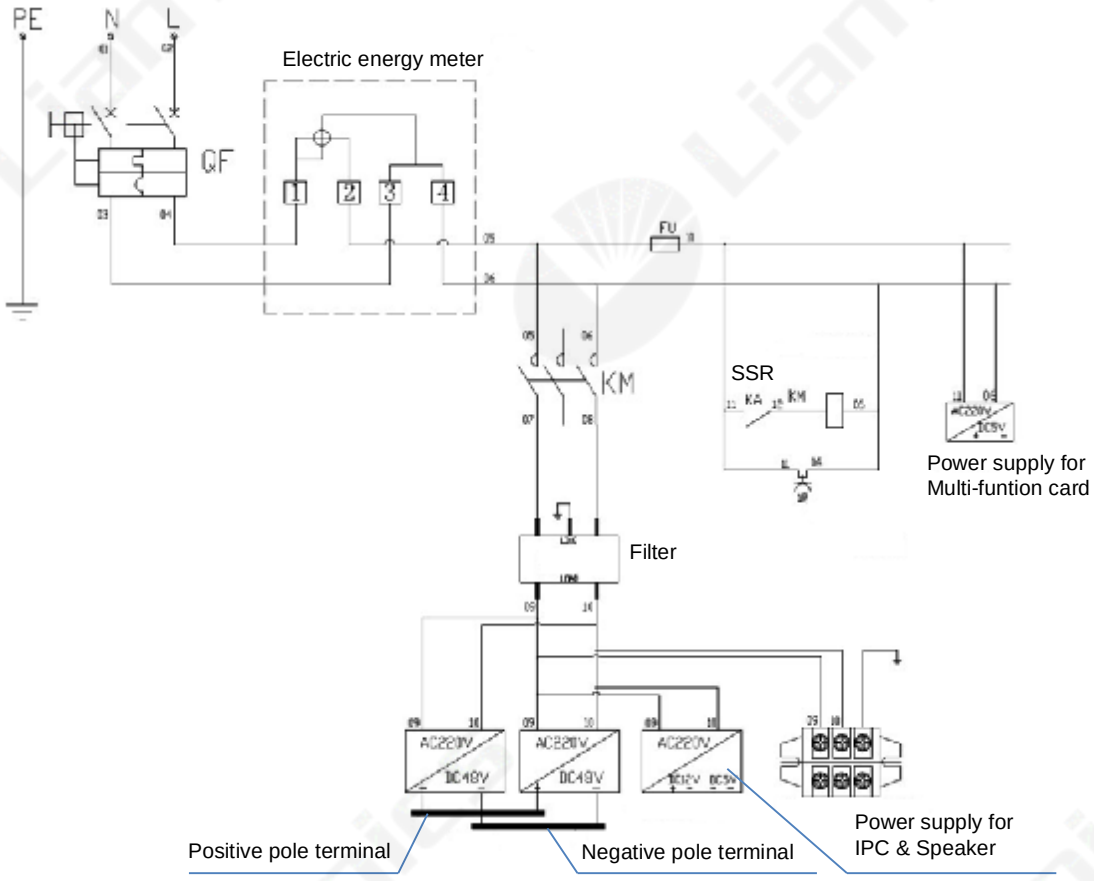


Image 3-9 PP series power supply system diagram

Selecting and layout of the power line

- LED display is supplied with AC220V power with good grounding and requires that the grid voltage fluctuation is less than 10%.
- Determine the diameter of the power cord according to the power of the display (Unit: mm^2, the cross-sectional area of the power cord).

The power supply has three-wire system (live, neutral and earth) or five-wire system (3 live wires, neutral and earth). When the maximum power consumption of the LED large-display is less than 10 KW, generally use single-phase three-wire power supply , and vice versa use the three-phase five-wire power supply.

4. INSTALLaTION

Installation Preparation

Good viewing angle and good sight for the surroundings

•Favorable ventilation conditions
•Safe and stable rating input voltage
•Suitable size, firm and stable installation table-board
•Rear maintenance space is more than 800mm from front to back.

Tools list for installation (choice depends on the practical jobsite)

1. Diagonal cutting plier Cut the wire	**2. Combination plier** Cut the steel wire rope	**3. Screw drivers** Install tiles and power supply
4. L shape spanners Tighten or loosen the screw	**5. End wrench tool set** Tighten or loosen the screw	**6. Adjustable wrench** Install tiles
7. Socket wrench Assemble the screen	**8. Digital multi-meter** Measure voltage or current	**9. Rubber hammer** Adjust the gap between tiles

Other tools for installation (choice depends on the practical jobsite)

Tools	Quantity	Function
Electric drill	1pc	Drill holes on the wall or frame
Rivet drill	1pc	Fix the cabinet in place
Electric adhesive plaster	Several	Isolate electricity after wire is connected
Tape measure	1pc	
High-brightness flashlight	1pc	Used in the dark area
Safety rope	Ref.	Personal safety, very important
220V power outlet board	1pc	Power supply
Level & vertical ruler	1pc	Test the level of the frame

Power connection

Open the back shroud which is showed in the Image 4-1. Then you can find the Terminal blocks which is showed in the Image 4-2.

Image 4-1 Back shroud of the PP series

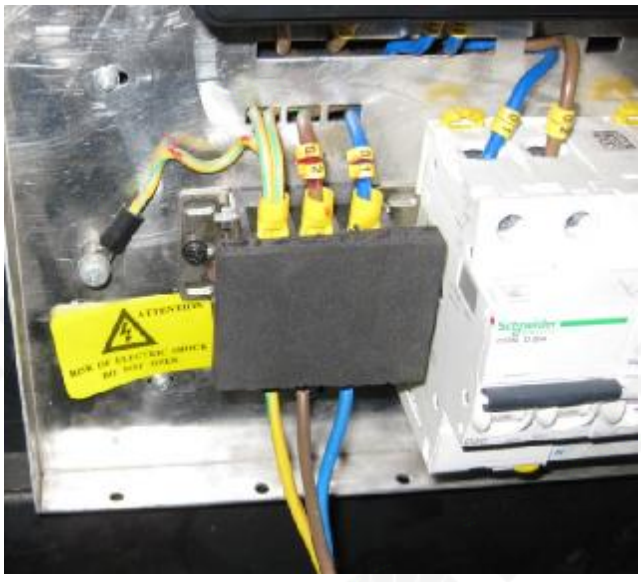


Image 4-2 Terminal blocks

If your local power voltage is 220V, you should connect the input power cable like Image4-3. The power voltage between L and N is 220V.

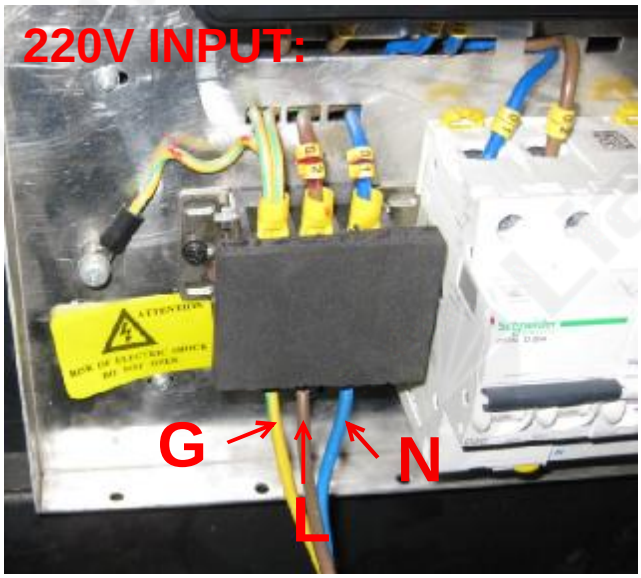


Image 4-3 Power connection of 220V power input

If your local power voltage is 110V, you should connect the input power cable like Image4-4. The power voltage between L1 and L2 is almost 190V.

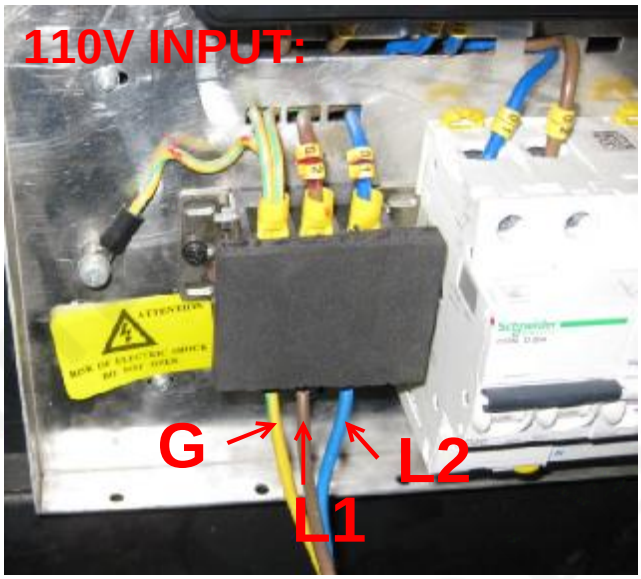


Image 4-4 Power connection of 110V power input

5. START-UP OF THE SYSTEM

5.1 Software Installation

Before you run the software, please make sure all connection are ready (From PC to sending card, from sending card to LED screen). Put the LED system installation CD into CD-ROM.

1.Double click

to start LED control software installation.

2.Follow the installation instruction until the installation procedure has finished.

5.2 System Operation

First, power on the control system computer, and switch on the power of LED display. follow the procedures and instructions as below :

1.Start Nova LCT control software

Install "**Nova LCT control software**", double click the icon (image 5-1) to open Nova LCT Mars control software, and the computer will enter to the interface as image 5-2. "**Local system info**" shows the real system connection information. when it shows "**Control System: 1**", it means the USB serial port connection is ready for communication between PC and controller . If not it shows "**Control System: 0**"for the connection is not good with no communication. If there is no image on LED screen (green indicator of sending card not flicking), please check DVI cable from graphic card to sending card, then check multi-display mode from control computer. Keep display mode under duplicate mode.

Image 5-1

Image 5-2

2. User Login

User login—This menu is for user to login. It is necessary for the configuration of the LED screen. Click "**User**",--"**Advanced Log-in**", enter password"**666**"or"**admin**".

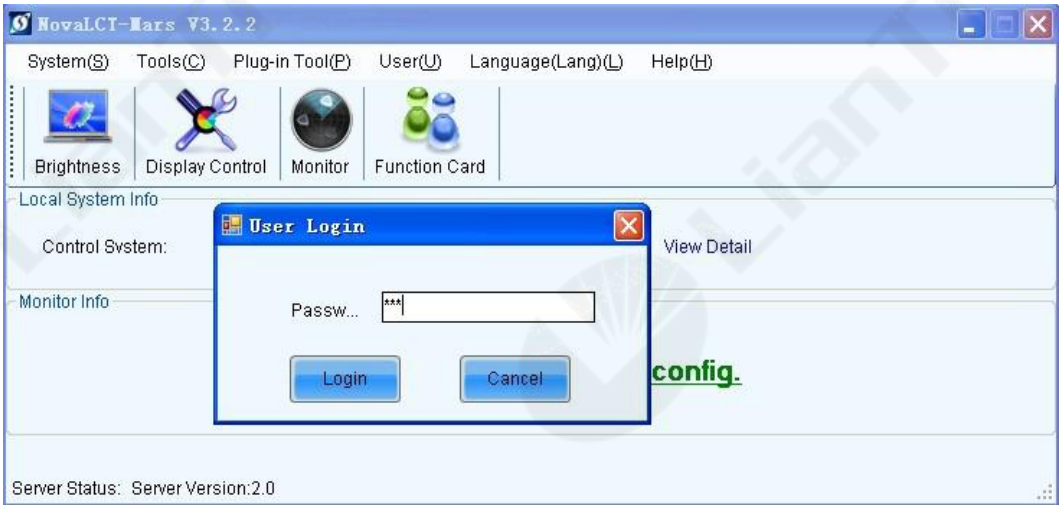


Image 5-3 Login interface

Select "**Config Screen**" directly to follow the next step:

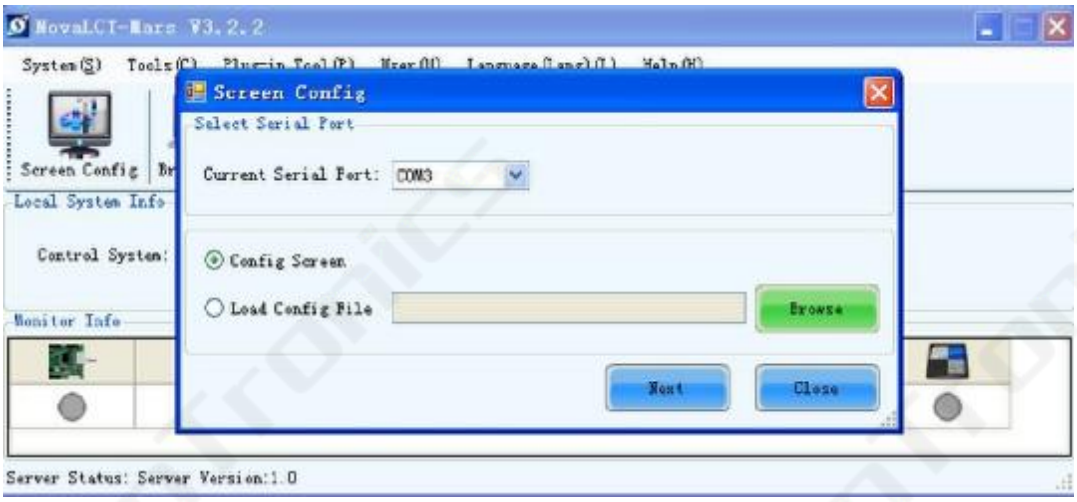


Image 5-4 Configuration interface

3.Go to sending board configuration : As is Shown in image 5-5, select proper resolution for sending card, and it should be close to graphic card. Click "**Save**" to save parameter on HW.

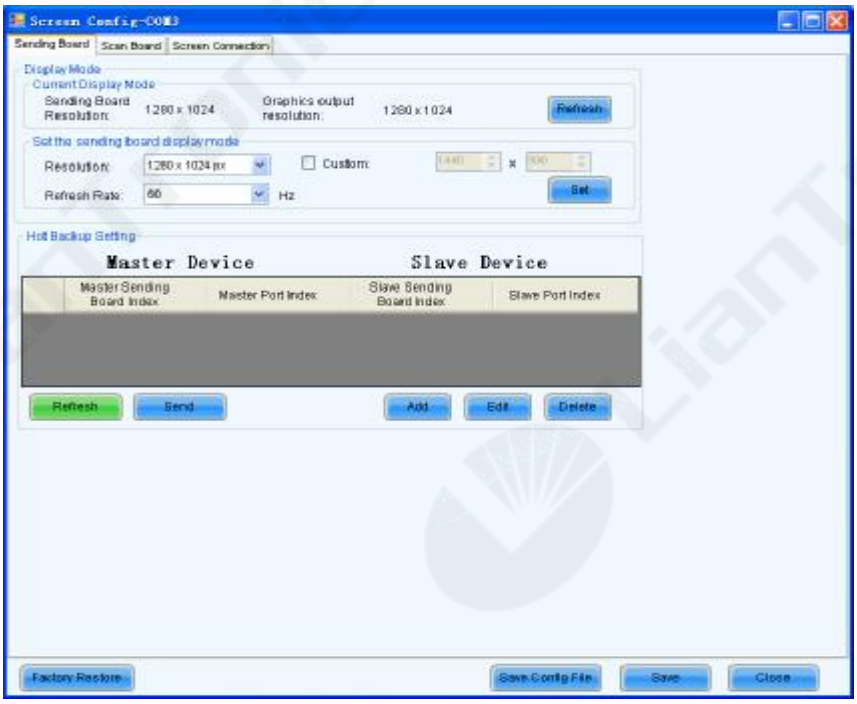


Image 5-5 Sending board configuration interface

4.Go to scan board configuration： As is shown in image 5-6, select "**Load File**", down load "*.**rcfg**" file from delivered CD. Click "**Send To HW** ", and then the file will be send to each scan board (receiving card). Click "**Save**" and save all files in hardware, when restart power ,files is no need to send again. **If tiles shows correct images before loading file, skip this step and directly jump to step 5.**

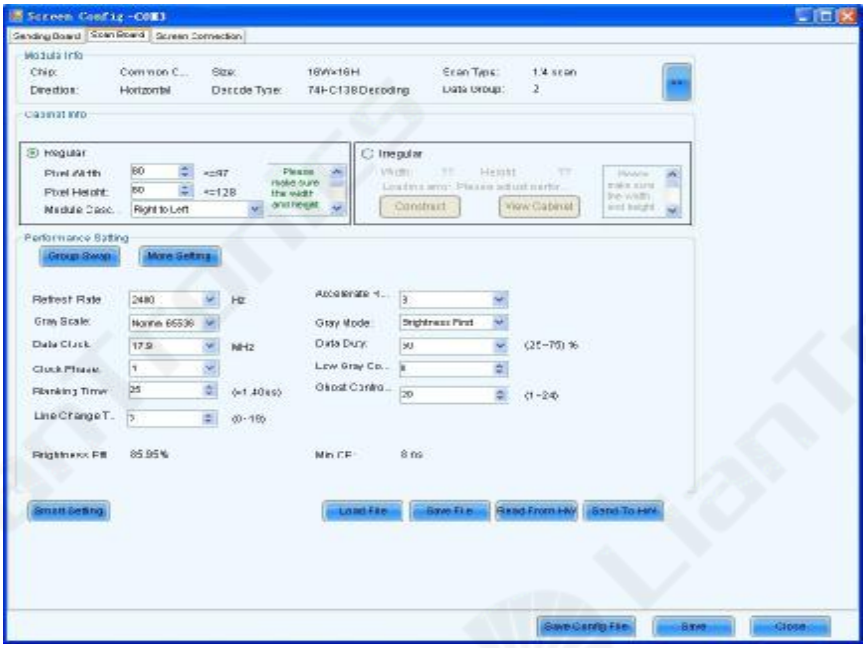


Image 5-6 Scan board configuration interface

5. Screen connection

According to the data cabling of your LED Display**,** fill in the actual value of columns and rows. Choose right ports and fill right scan board size as below. Select correct direction of signal cable cascading. Image 5-7 shows the front view of screen (see from image4-6) “S” for the first tile and “E” for the last one. Choose “**Send to HW**” and “**Save**”.

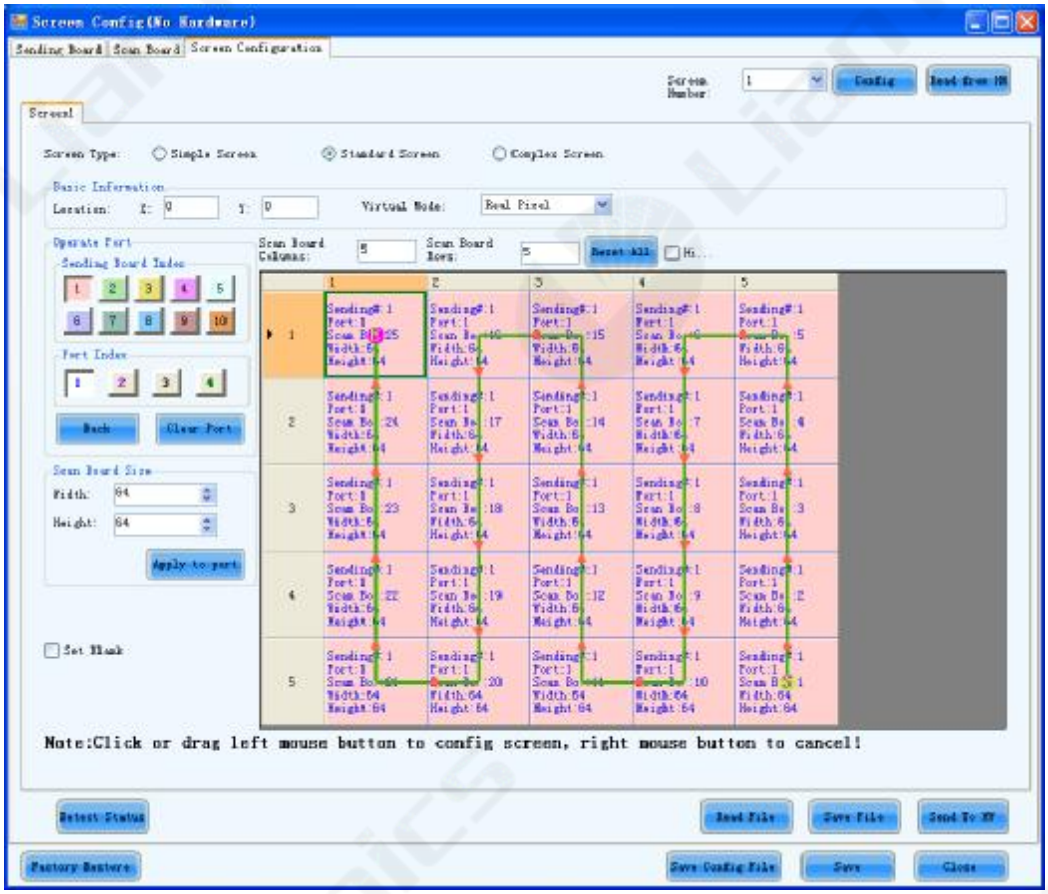


Image 5-7 Screen connection interface

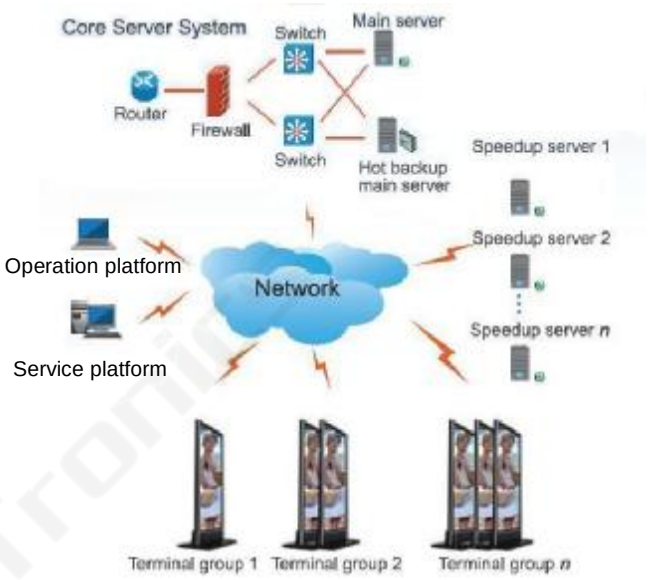
6. Terminal Server

6.1 Nebula TC Software Instruction

Advertising display terminal is an unmanned multi-media system. After being connected with Nebula system, terminals can realize information transmission with the system and the system can offer all kinds of services for terminals. Terminals will periodically visit the server to receive and perform the control command: terminals will download and broadcast the list /do the listing, and collect and feed back execution result as well as play log for operation platform to check.

Several tips shall be noted in order to make the system automatically start up and enter into Nebula terminal working state: 1. There can only be one user name for operation system; 2. There should not be password for operation system; 3. The Windows7 system shall set the terminal executable permissions only for the administrator.

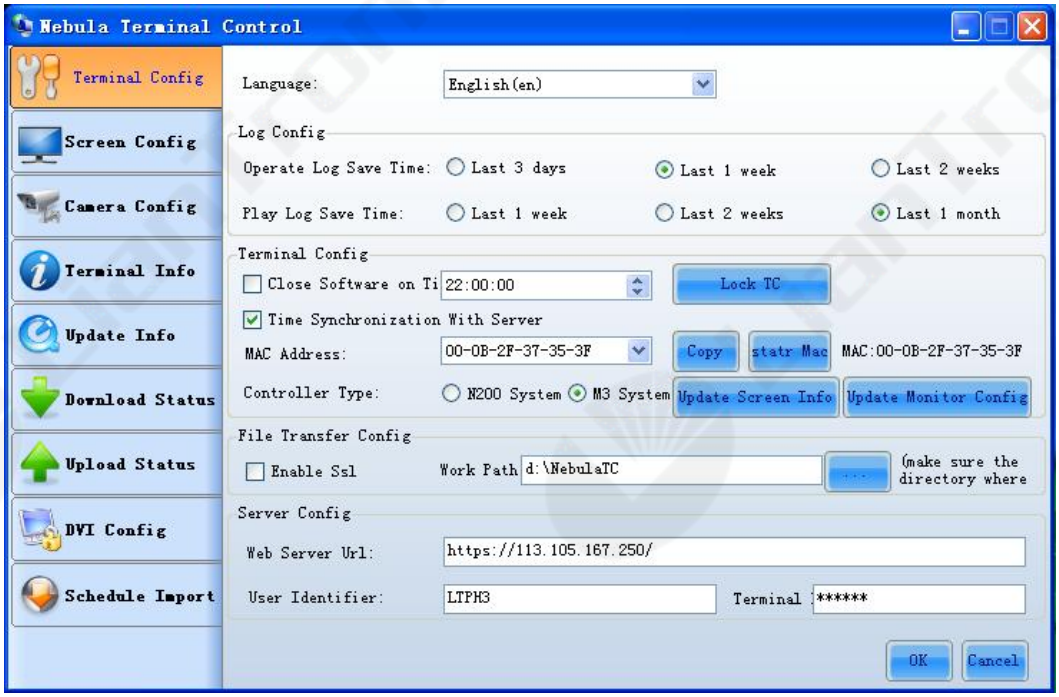
Advertising display terminal settings include three parts: terminal information configuration, display configuration and camera configuration. Terminal information configuration is to set terminal registration, communication rules and relative information to the server to ensure right authentication and normal communication in Nebula system. Display configuration is to set mapping area and location of the display in IPC, and program broadcasting configuration to make sure that terminal can play correctly and smoothly. Camera configuration provides a means of on-spot and desktop monitor. By camera configuration, users can take photos and get screen shots of the desktop and send them to the server. The platform can monitor these photos and shots to know system operation status.



6.2 Install the Nebula TC Software

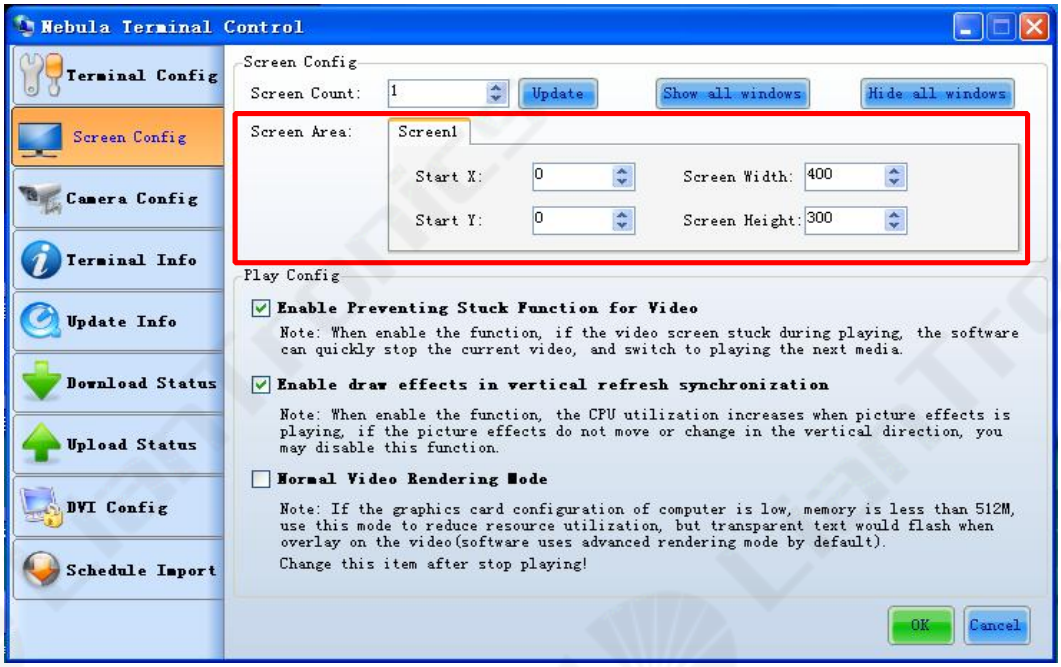
After Nebula TC is installed, terminal server will be automatically set as " automatic operation after system startup".
If you need manual start, click Nebula TC in the Start Menu, shown as below:

6.3 Main interface of Nebula TC：



6.4 Screen Configuration

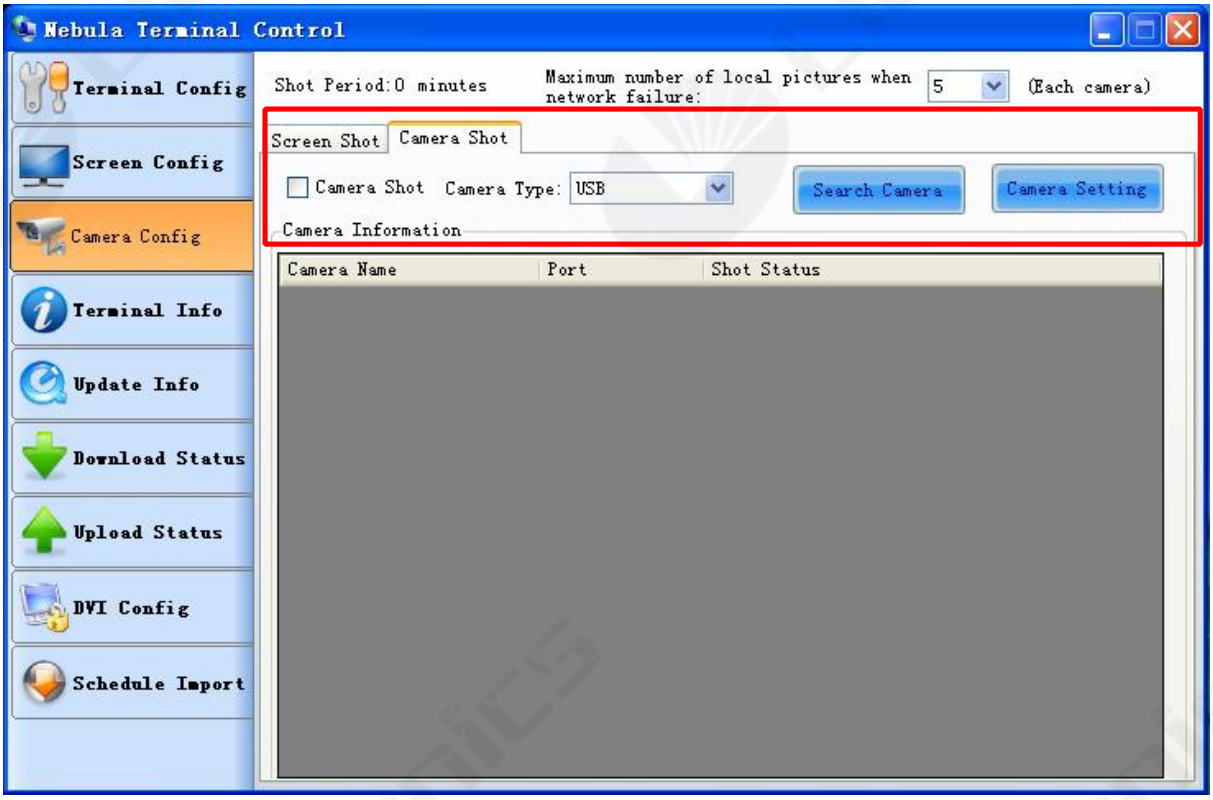
Fill in the blank according to the actual size and mapping area of the display in order to play the contents accurately and completely.


Nebula Terminal Control
Terminal Config
Screen Config
Camera Config
Terminal Info
Update Info
Download Status
Upload Status
DVI Config
Schedule Import
Screen Config
Screen Count:
1
Update
Show all windows
Hide all windows
Screen Area:
Screen1
Start X:
0
Screen Width:
400
Start Y:
0
Screen Height:
300
Play Config
Enable Preventing Stuck Function for Video
Note: When enable the function, if the video screen stuck during playing, the software can quickly stop the current video, and switch to playing the next media.
Enable draw effects in vertical refresh synchronization
Note: When enable the function, the CPU utilization increases when picture effects is playing, if the picture effects do not move or change in the vertical direction, you may disable this function.
Normal Video Rendering Mode
Note: If the graphics card configuration of computer is low, memory is less than 512M, use this mode to reduce resource utilization, but transparent text would flash when overlay on the video(software uses advanced rendering mode by default).
Change this item after stop playing!
OK
Cancel

6.5 Camera Settings

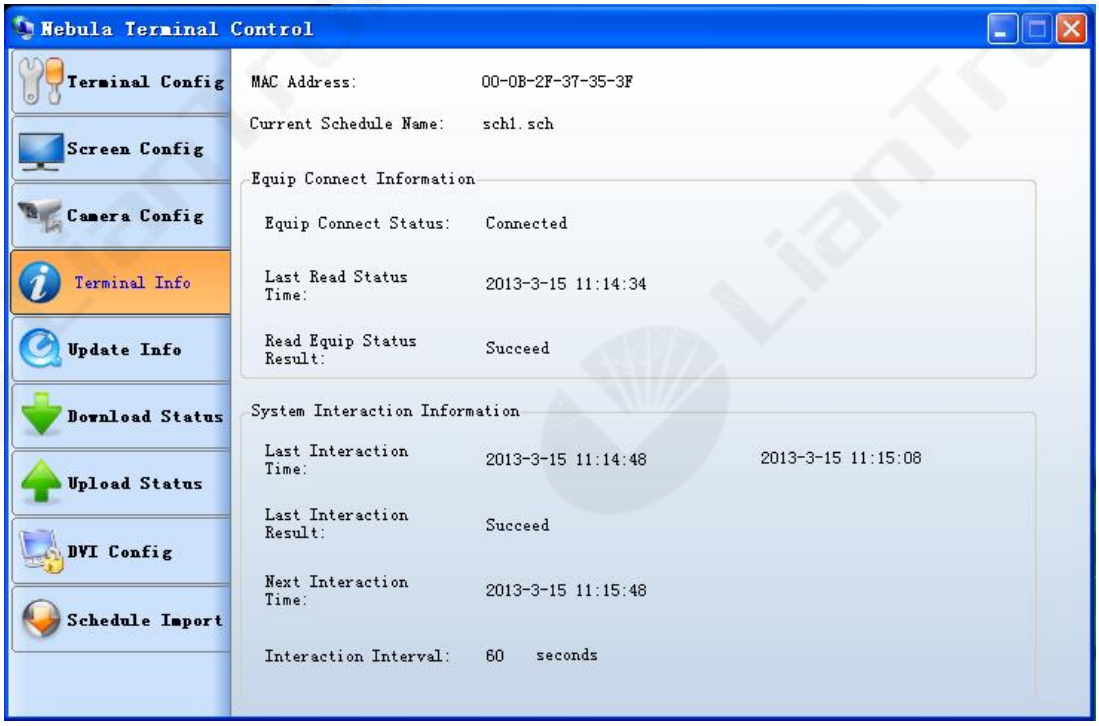
On-site visible monitoring solution would be provided, which is involved with screenshots of the multimedia player as well as timing photo-taking of the camera. Through the operation platform, the pictures which are uploaded to the server could be seen and downloaded. The maintenance personnel can know the situation of the screen via screenshots. Besides, the condition of surroundings and audience can be detected through the camera photo-taking process.

In the camera configuration bar, picture-capturing size and position could be set via sub-dialogue--- camera shot. Remember to tick and select “camera shot".



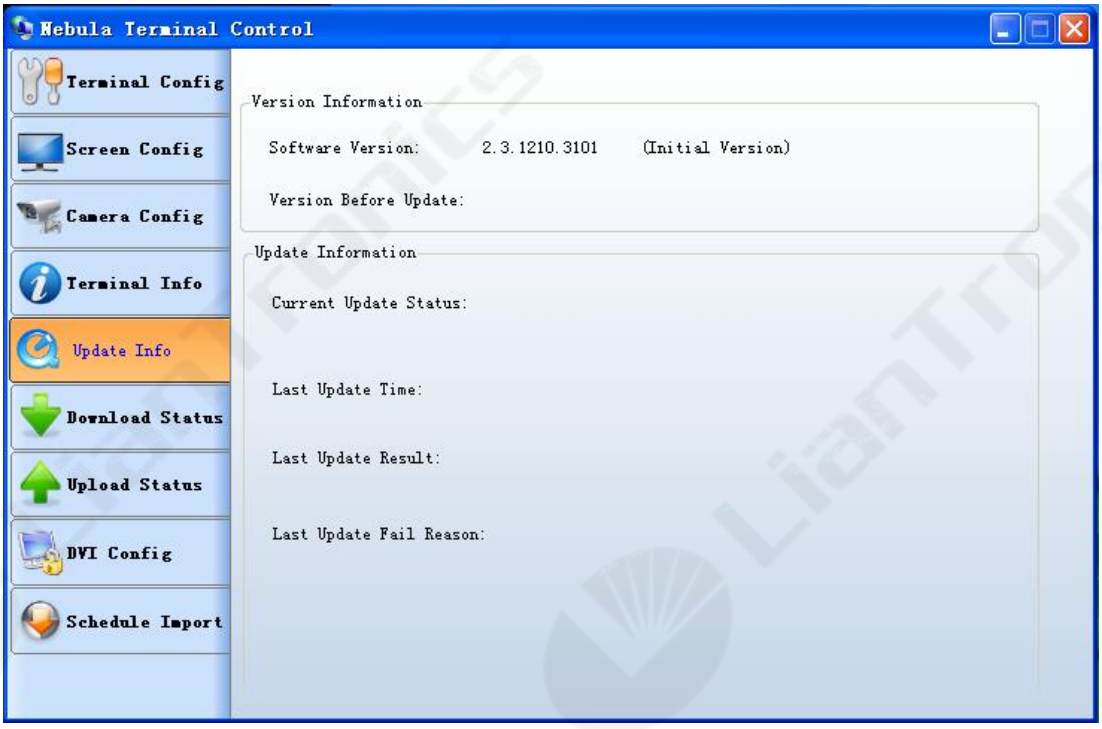
6.6 Basic Information of the Terminal

Basic information of the terminal mainly indicates the current status of the terminal. For instance, the MAC address, equip connect status, read equip status result, interaction interval, last interaction time and result. See the picture below:



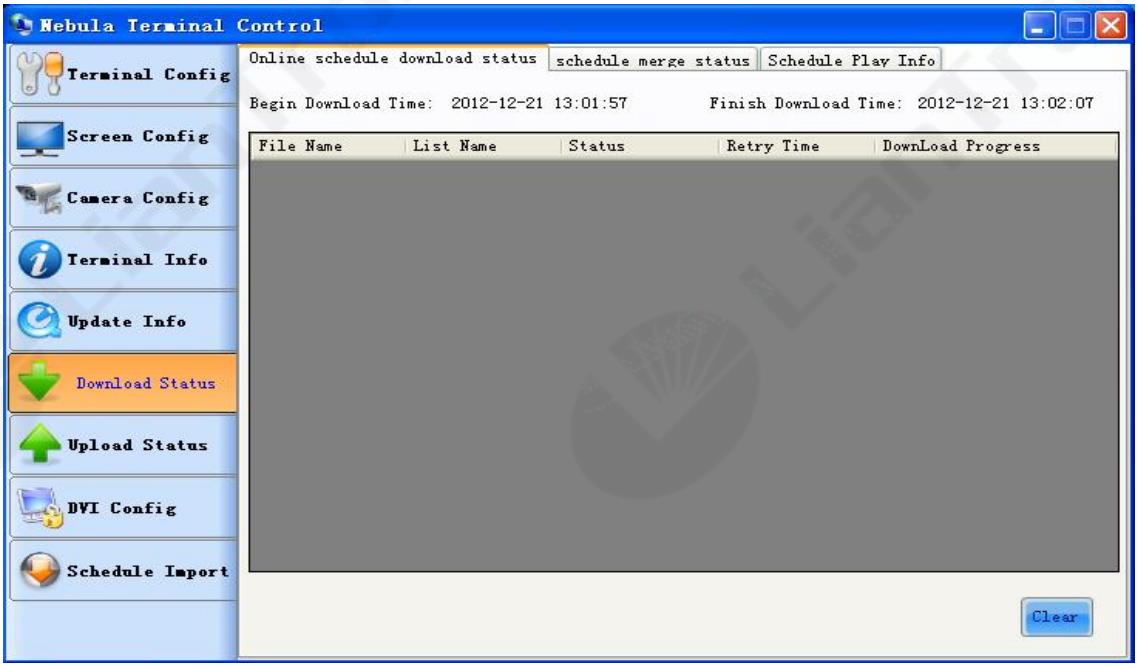
6.7 Software Update Information

This part maintains the current version of terminal and the update status of terminal version, as shown in the following picture:



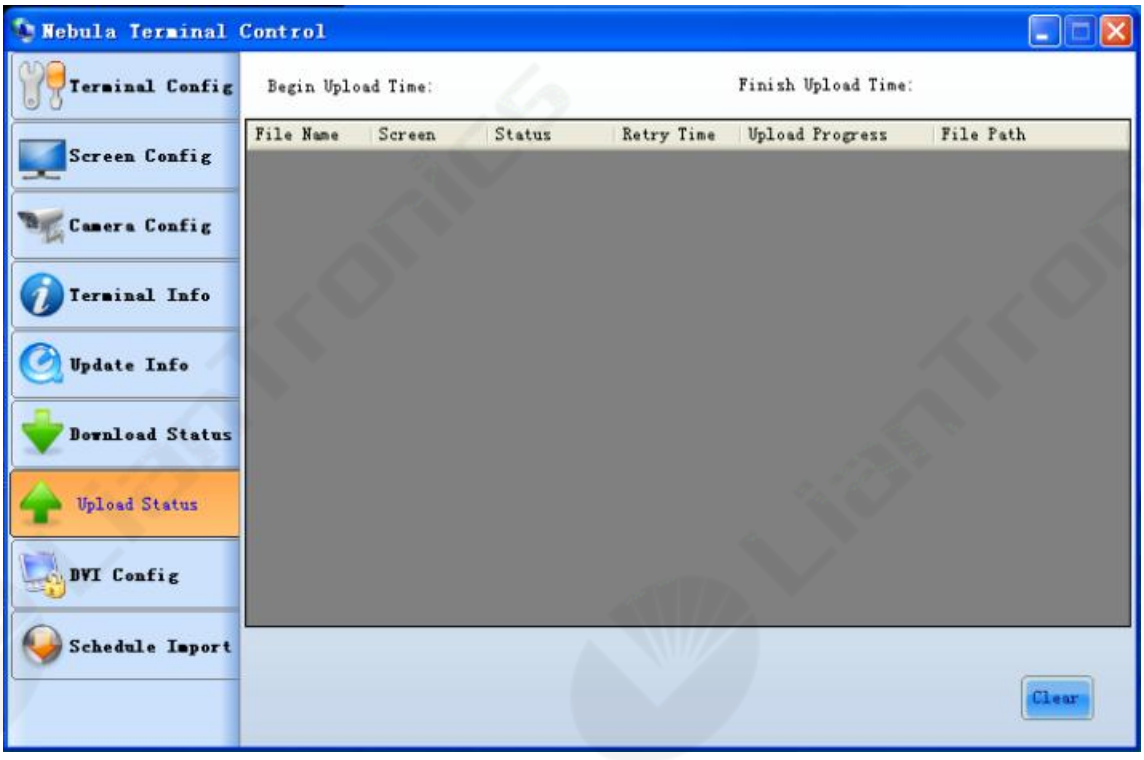
6.8 Download Status of the List

Terminal of the advertising display would download the list from the server and play it in accordance to its schedule. After receiving the download list or schedule order, the terminal would start to download, and the whole progress together with the result can be clearly seen .



6.9 Log Upload Status

When the platform commands the terminal to upload play log, the upload progress and result would be fully demonstrated. See the following picture:



7. Trouble Shooting

7.1 Software Trouble

Problem type	Problem description	Solution	Reason	Analysis
Nova LCT	Unable to open NovaLCT	Replace LCT software	Software problem	
	System notice: NovaLCT.exe-error	Install Microsoft .NET Framework 2.0	Computer is not installed wit h .NET Framework software	1.Computer is not installed with .NET Framework 2. Already installed, but may be damaged
	LCT system connection fails	Check the RS-232 connection and communication	The RS-232 communication is not connected or could not get through	
		Replace LCT	LCT communication is not stable	Nova LCT version may be changed, confirm that you use the right version.
	display brightness is not uniform	Set values of R, G, B brightness on the all controllers as the same	Controller's R,G,B brightness values are not the same	1. Brightness values are not the same. 2. Data is not saved successfully after setting.
		The calibration mode of controllers did not set to “On”.	The brightness is different before and after calibration	1. Calibration mode is not “On”. 2.All the calibration modes are “On”, but not successfully saved after setting
		Change the brightness adjusting mode	Brightness adjusting modes are different between different controllers	1. Brightness adjusting modes are not set as the same 2.The setting is not saved successfully
		Check Gamma value of different controllers and resend the database	Gamma values are varied for different controllers	
		If brightness adjusting is in auto mode and controlled by sensor, new update needs to wait for 30 seconds	Brightness sensor action need to wait for 30 seconds.	
	LCT software monitor shows wrong status	Change and re-install LCT software	Software problem	
	One area of receiver card is black	Check the row and column setting in LCT	Map setting in the LCT is wrong	
Nova Studio	The whole display is black	Close the play time schedule	Time schedule setting is wrong	
		Check the media source	Media source is lost or stopped	

7.2 System Hardware Trouble

Problem type	Problem description	Solution	Reason	Analysis
Controller	Black screen	No HDMI signal output from the graphics card in PC	No HDMI signal to the controller	
		Check the power of the controller	No power for the controller	
		Re-start the controller		
Divider	Divider driving area is black	Check **RUN** status on the divider. If it blinks 2 seconds once, it means no data from the fiber cable.	There is no data from the controller or the fiber cable is not well connected	Divider is working when **RUN** lamp blinks 2 times per second. The lamp blinking 2 seconds per time means no data is output from controller or the fiber is broken
		Check the power of the divider	No power for the divider	
Receiver card	Receiver card problem causes black display on single tile	Check data input from upper receiver card(**RUN** lamp blinks 2 times per second). If the data in is ok but problem still exists, replace the receiver card	Hardware problem	
		If there is no data input from the cat5, check the cat5 connection or no data output from the upper receiver card	Poor Cat5 connection or output data problem of the upper receiver card	
	One row of the module in the tile is black or messed up	Check the hub card connection with the scan card, or the ribbon cable connection between the hub card and module. If connection is no problem, replace the hub card	Connection problem or hardware problem	

7.3 Module Problems

Problem type	Problem description	Phenomenon & Solution	Reason	Analysis
LED lamp	Blind lamps	Replace the module	The lamp is dead or soldering is not good	
LED pixel	The pixel area is black or loses color	Replace the module	The driving IC/resistor is bad soldered or out of work	
LED module	One or several whole LED modules in the same row are black or defective	Check the ribbon cable and power cable connection on the module	Cable is not connected or not well connected	

7.4 Power Problems

Problem type	Problem description	Phenomenon & Solution	Reason	Analysis
Tile power	The whole tile is black	Check power connection with the tile and the breaker in the tile	Power to the tile is not well or the breaker is turned off	
Power supply	The whole tile is black	Replace the defective power supply	The power supply feeding the receiver card is defective	
Power supply	Several nearby module areas are black	Replace the defective power supply	The power supply feeding the module area is defective	

7.5 Data Transfer Problems

Problem type	Problem description	Phenomenon & Solution	Reason	Analysis
Cat 5	The whole column of the display is black	Check the data connection between the divider and the first scan card	The connection is not good or the cat5 is defective	
Cat 5	One or several tiles in column are black	Check the cat5 connection between the tiles	The connection is not good or the cat5 is defective	
Cat 5	All the display light up but the columns are not in right order	Check and correct the Cat5 connection order in the divider	The connection order is wrong	

8 Maintenance

Routine maintenance

1. Make sure the LED display is well ventilated, dry and running in suitable temperature.
2. Regularly check the internal cables inside the LED display are in stable connection, the power supplies are working well, the ground wires are connected well, and the lightning arrester is running well.
3. Regularly wipe the dust on the surface of the LED tile with a soft cloth, and keep the LED display surface clean to avoid brightness differences between clean and unclean LED tiles.

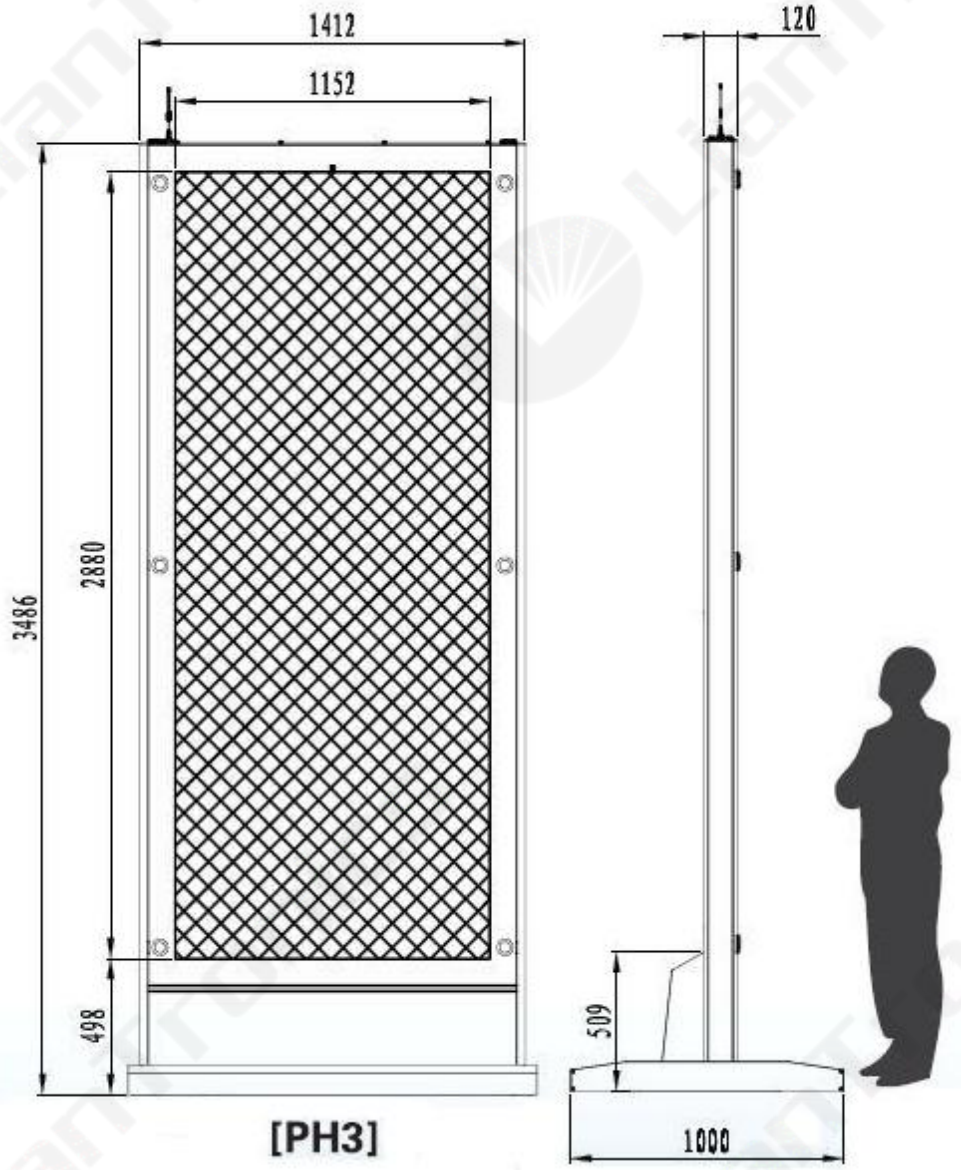
Cautions for use

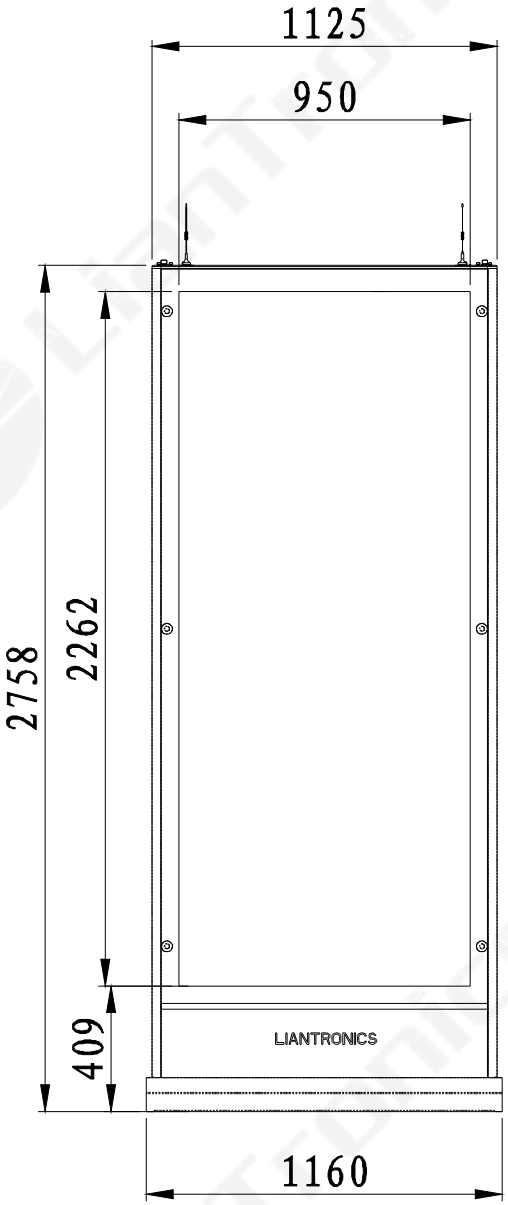
1. Before power on the LED display, start your computer first, and then turn on the power of LED display.
2. Before turn off the display system, first turn off the power of LED display, and then turn off the computer.
3. When you are editing video playlist, you had better to keep the LED display off.
4. When failure appears, first turn off the power of LED display, then contact with service department of LIANTRONICS for technical support.

Appendix A: Technical Specification

Item	PP series	
Pixel Pitch (mm)	3	2.4
Screen Size	122'' diagonal	97'' diagonal
Dimensions	1412mm(L)X3486mm(H)X120mm(D)	1112mm(L)X2758mm(H)X120mm(D)
Display Size	1152mm(L)X2880mm(H)	952.32mm(L)X2261.76(H)
Resolution	384pixels(L)X960pixels(H)	384pixels(L)X912pixels(H)
Weight	200Kg	190Kg
Power Consumption	750W (Average) / 2400W (Max)	600W (Average) / 2000W (Max)
Brightness	1200cd/m^2	
Viewing Angle	H: 160° / V:160°	
Contrast Ratio	3000:1	
Refresh Rate	≥1920Hz	
Frame Rate	60Hz	
Color Temperature	2000K≤TC≤9300K (Adjustable)	
Brightness Adjustment	Programmable/ Auto/ Manual	
Signal Processing	16bit	
Communication	WiFi/ 3G/ CAT 5	
Protection Grade	IP32	
Life Span	50,000hrs	
Power Supply Voltage	176-264V(AC)	
Operation Temperature	-20° ~ +50°	
Storage Temperature	-40° ~ +60°	
Relative Humidity	10% ~ 95%	
Protection	Moisture-proof, dust-proof, flame retardant	
	Anti-corrosion, anti-static, anti-seismic	
	High temperature & lightning protection	
Safety	Over current or short circuit protection	
	Over voltage or low voltage protection	
	Temperature alarm	
Failure Monitoring	Monitoring of temperature, voltage, working condition, network failure	

Appendix B: Dimensions

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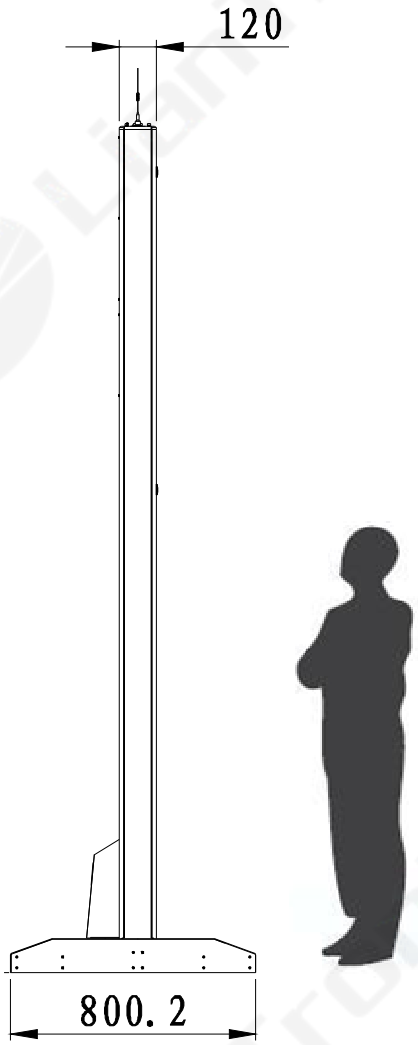
LIANTRONICS
1160


120
800.2

LianTronics

ISO9001:2008
ISO14001:2004

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